**Supplement 1. Confirmatory Factor Analysis (CFA)**

**Method**

We compared three item-level CFA models for how well they described the covariation among SCID-II PD symptoms. The first model included a single factor upon which all symptoms loaded. The second model included six correlated factors each representing a PD diagnosis with no cross-loadings. The third model included a general factor upon which all items loaded, as well as six specific factors that each represented a PD diagnosis. We tested two versions of the bifactor model: an orthogonal version where the specific factors were uncorrelated (Holzinger & Swineford, 1937), and an oblique version where the correlations among specific factors were freed. In both versions, the general and specific factors were uncorrelated.

Some authors have shown that the bifactor model’s superiority over other models is partly due to its complexity and overfitting tendencies (Greene et al., 2019; Murray & Johnson, 2013; Reise, Kim, Mansolf, & Widaman, 2016). Therefore, models were estimated using the robust maximum-likelihood estimator (MLR) and compared using Akaike Information Criteria (AIC), Bayesian Information Criteria (BIC), and sample-size adjusted Bayesian Information Criteria (aBIC), which penalize for model complexity based on the number of freely estimated parameters. A difference of 2 (AIC/BIC/aBIC) between models was considered negligible; a difference of 2-7 (AIC) or 2-6 (BIC/aBIC) suggested some evidence favouring the competing model; a difference of 7-10 (AIC) or 6-10 (BIC/aBIC) suggested strong evidence favoring the competing model, and a difference greater than 10 (AIC/BIC/aBIC) suggested very strong evidence favouring the competing model (Raftery, 1995).

We also re-estimated models with the weighted least squares means and variances adjusted estimator to assess their global fit. Acceptable fit was defined by Comparative Fit Index (CFI) values ≥ .90, Tucker-Lewis Index (TLI) values ≥ .90, and root mean squared error of approximation (RMSEA) values ≤ .08, whilst excellent fit was indicated by CFI values ≥ .95, TLI ≥ .95 and RMSEA ≤ .06 (Hu & Bentler, 1999). All models were estimated in Mplus 8.0 (Muthén & Muthén, 2017).

A bifactor model might fit the data better than competing models, but this tells us little about the reliability of the general and specific factors (Sellbom & Tellegen, 2019). We therefore calculated model-based reliability indices for the bifactor model from the MLR factor loading matrix using Dueber’s (2017) Bifactor Indices Calculator. Reliability indices included omega hierarchical and omega hierarchical subscale (ωH/ωHs; the proportion of variance in raw total or subscale scores explained by a given factor, respectively), explained common variance and explained common variance-subscale (ECV/ECVs; the proportion of variance in modelled total or subscale scores explained by a given factor, respectively), factor determinacy (FD; the reliability of factor scores), and construct replicability (H; the reliability of a factor given its indicators; Rodriguez, Reise, & Haviland, 2016). ωH/ωHs and ECV/ECVs values ≥ .7 indicate that the majority of raw or modelled variance, respectively, is explained by a single factor (Rodriguez et al., 2016). FD values ≥ .9 (Gorsuch, 1983), and H values ≥ .7 (Hancock & Mueller, 2001), reflect reliable factor scores or factors, respectively.

**Results**

The single factor model fit the data poorly (see Table S1) but showed healthy positive loadings across symptom items, demonstrating their unidimensionality (see Table S2). The correlated factors model–with factors representing each PD–showed a good fit that improved on the single factor model (ΔAIC = 2,843; ΔBIC = 2,756; ΔaBIC = 2,804; see Table S1). There were no signs of local strain and each factor showed healthy positive loadings (see Table S2). All factors were positively and uniformly correlated (aside from the antisocial factor), suggesting the presence of a higher-order factor (see Table S2).

The orthogonal bifactor model–with a general factor and uncorrelated specific factors representing each PD–showed a good fit that improved on the correlated factors model (ΔAIC = 443; ΔBIC = 247; ΔaBIC = 355; see Table S1). By contrast, the oblique bifactor model–with a general factor and correlated specific factors–did not converge, so we only interpret the orthogonal model. The bifactor solution was multidimensional, with the common variance split between the general PD factor (42%) and specific factors (58%), favouring the latter. However, the variance in raw total scores (e.g., overall PD symptomatology) was mostly explained by the general PD factor (ωH = .79). The variance in raw subscale scores (i.e. specific PD scores) was also largely explained by the general PD factor rather than respective specific PD factor, except for the antisocial factor (ωHs = .74) and narcissistic factor (ωHs = .68). Most factors were adequately represented by their indicators, apart from the avoidant (*H* = .64) and borderline (*H* = .59) factors.

Table S2 shows the factor loadings for the orthogonal bifactor model. On average, narcissistic PD items loaded strongly on the specific narcissistic factor ( = 0.63, *SD* = 0.19) and weakly on the general PD factor ( = 0.37, *SD* = 0.13). Similarly, antisocial PD items loaded strongly on the specific antisocial factor ( = 0.82, *SD* = 0.05) and moderately on the general PD factor ( = 0.48, *SD* = 0.11). The specific borderline and avoidant factors explained the least amount of common variance (ECVs = .04 and .05, respectively) and raw subscale variance (ωHs = .20 and .31, respectively), and showed weak and moderate factor loadings, respectively (borderline: = 0.32, *SD* = 0.17; avoidant: = 0.43, *SD* = 0.10), as well as the strongest general factor loadings (borderline: = 0.58, *SD* = 0.09; avoidant: = 0.59, *SD* = 0.08). Some schizotypal PD items loaded preferentially onto the specific schizotypy factor ( = 0.54, *SD* = 0.32), while others loaded preferentially onto the general PD factor ( = 0.43, *SD* = 0.20). Obsessive-compulsive PD items showed weak general PD factor loadings ( = 0.36, *SD* = 0.10) and moderate obsessive-compulsive specific factor loadings ( = 0.43, *SD* = 0.10).

**Discussion**

Consistent with past studies, we found that a bifactor model with general and specific PD factors described the covariation among PD symptoms best (Conway et al., 2016; Jahng et al., 2011; Sharp et al., 20151; Williams et al., 2017; Wright et al., 2016). We also found that borderline PD items loaded most strongly onto the general PD factor rather than the specific borderline factor (Conway et al., 2016; Sharp et al., 2015; Williams et al., 2017; Wright et al., 2016). This supports the ideathat general PD reflects dysfunction in self-functioning (e.g., stability and coherence in one’s sense of identity) and interpersonal functioning (e.g., the ability to relate to and empathise with others), which is consistent with Criterion A of the DSM-5 Section III alternative model of personality disorders (American Psychiatric Association, 2013). Avoidant personality disorder (PD) items also loaded preferentially onto the general PD factor rather than the specific avoidant factor, particularly items associated with self-impairment (‘views self as inept’) and interpersonal problems (‘preoccupied with rejection’).

By contrast, avoidant and narcissistic PD items loaded most strongly onto their respective specific factors, as has been reported by others (Sharp et al., 2015; Williams et al., 2017; Wright et al., 2016). This follows the general trend in psychopathology research, whereby antisocial and substance-related problems load preferentially onto externalizing factors rather than the general psychopathology factor (Caspi et al., 2014; Lahey et al., 2012). It is important to note that while narcissistic PD items showed weak general factor loadings, antisocial PD items showed moderate general factor loadings. Therefore, it is not the case that all externalizing-type personality items are distinct from the general PD factor, but rather, some show reliable measurement beyond the general variance.

Schizotypal PD items were split between the general and specific schizotypal factors in a pattern mirroring prior item-level analyses (Sharp et al., 2015; Williams et al., 2017). For example, items associated with ideas of reference, suspiciousness, and social anxiety loaded more strongly onto the general PD factor (and showed some of the strongest general factor loadings among all items), whereas items associated with unusual perceptions, beliefs, and behaviours loaded more strongly onto the specific schizotypal factor. This pattern may be best understood as a divide between severity and style (Hopwood et al., 2011): paranoid thinking and anxiety accompany a range of severe presentations (Caspi et al., 2014), whereas odd beliefs and behaviours are characteristic of schizotypal personality traits that are not necessarily pathological (van Os & Reininghaus, 2016). Finally, obsessive-compulsive PD items showed weak-to-moderate loadings on both the general and specific obsessive-compulsive PD factor.

Upon a closer examination at the item level, items that loaded most strongly onto each specific PD factor resemble items that define the trait domains outlined in the ICD-11 and DSM 5 alternative models of PD. This is demonstrated in the table below using trait domain items from a large, multi-national study that replicated a six-factor trait structure in both patient and community samples (Bach et al., 2020). A six-factor trait structure is also consistent with recent developments in personality research (e.g., HEXACO model; Ashton & Lee, 2007). Our specific factors likely reflect trait domains–which is naturally the next level of analysis after controlling for general functioning–though we are lacking direct measures to validate this.

Table 1. Top Three Items Loading on Each Specific PD Factor in the Bifactor model (left) and Bach et al.’s (2020) Trait Domain Factors (right)

|  |  |
| --- | --- |
| PD Item | Trait Domain Item |
| Antisocial | Disinhibition  **Irresponsibility**  **Impulsivity**  Distractibility |
| Disregard for safety (*λ* = .89) |
| Irritable, aggressive (*λ* = .85) |
| Failure to conform (*λ* = .86) |
| Avoidant | Detachment  **Withdrawal**  Anhedonia  **Intimacy Avoidance** |
| Socially inhibited (*λ =* .62) |
| Views self as inept (*λ* = .47) |
| Must be liked (*λ* = .46) |
| Borderline | Negative Affectivity  **Emotional lability**  Anxiousness  **Separation insecurity** |
| Affective instability (*λ* = .49) |
| Interpersonal instability (*λ* = .48) |
| Intense anger (*λ = .*46) |
| Narcissistic | Antagonism  **Manipulative**  **Deceitfulness**  **Grandiose** |
| Believes s/he is special (*λ* = .85) |
| Grandiose (*λ* = .81) |
| Exploitative (*λ* = .73) |
| Obsessive-compulsive | Anankastia  **Perfectionism**  **Rigidity**  **Orderliness** |
| Workaholic (*λ* = .54) |
| Orderly (*λ* = .52) |
| Reluctant to delegate (*λ* = .52) |
| Schizotypal | Psychoticism  **Unusual beliefs**  **Eccentricity**  **Perceptual dysregulation** |
| Odd thinking/speech (*λ* = .90) |
| Odd behavior/appearance (*λ* = .82) |
| Odd beliefs + constricted affect (*λ* = .77) |

*Note.* There is not meant to be a one-to-one correspondence between each PD item and trait item. Trait items that overlap with at least one PD item within each problem area are in bold.

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